

## Method for representing animated menu buttons

### Field of the invention

5

This invention relates to a method for adding animated menu buttons to an optical storage medium.

### 10 Background

Today's optical storage media formats are capable of supporting visual menus, e.g. for content management or control functions. Applications of such visual menus are the  
15 selection of one out of multiple titles on the disc, the selection of a chapter within a title, and others. From the user perspective, such menus consist of a number of buttons shown on the display. The user may navigate within the menu, e.g. by pushing the up, down, left and right buttons on his  
20 remote control to select a menu button, and may activate a menu button through some kind of "OK" button on the remote control. An indicator, usually a highlight or an arrow, may provide feedback to the user, showing which button is currently selected or activated. A menu button may have one of  
25 the states "normal", "selected" or "activated".

However, known DVD menus are rather limited concerning extra features, since they contain only static visual buttons.

30 Further, a subtitling specification contained in the document "ETS 300 743: Digital Video Broadcasting (DVB); Subtitling System" (DVB-ST), provided by the European Telecommunication

Standardization Institute (ETSI), is known for embedding subtitles into video sequences.

5 Summary of the Invention

The present invention may be utilized to give more feedback to the user who operates a menu related to an optical storage medium. The feedback comprises visually and/or aurally  
10 animated buttons. A method to provide such feedback is disclosed in claim 1.

A storage medium that contains an animated menu is disclosed  
15 in claim 9.

An apparatus suitable for presenting such menu is disclosed in  
claim 10.

According to the invention, a menu button shown on a display  
20 may look different, depending on its state. The state may be "normal", "selected" or "activated", and for each of these states the button may have different color or shape. Additionally, a sound or sound sequence may be attached to some or all menu buttons, depending on the buttons state.  
25 Examples for sounds are a click or a melody, or a speech sequence. The current invention provides a data structure by which those additional features can be described.

Advantageous embodiments of the invention are disclosed in the  
30 dependent claims, the following description and the figure.

Brief description of the drawing

An exemplary embodiment of the invention is described with reference to the accompanying drawing in Fig.1, which shows an on-screen menu according to the invention, and a corresponding remote control.

Detailed description of the invention

Fig.1 shows a video screen 1 containing a menu that comprises buttons 2,3 and related text describing the buttons. When a user presses a button 5,6 on a remote control 4, the state of a button 2,3 may change, and also the representation of the button. In Fig.1 one button 2 is selected, and thus looks different from the unselected buttons 3. When the user e.g. presses the "right" button 6 on the remote control, another button 3 is selected being right from the currently selected button 2. When the user presses the "OK" button 5, the selected button is activated, and the function associated with the selected button is performed. The selected button 2 according to the invention is animated, e.g. has another color and another shape than an unselected button 3, and its color or shape may change. Particularly, the button may also be replaced by a moving symbol, a moving cartoon or the like, depending on the state.

A preferred embodiment of the invention is based on the syntax and semantics of the subtitling specification contained in the document "ETS 300 743: Digital Video Broadcasting (DVB); Subtitling System" (DVB-ST), provided by the European Telecommunication Standardization Institute (ETSI). To provide enhanced capabilities for menus relating to optical storage

media, the page composition segment defined in DVB-ST is extended to describe animated menu buttons and to associate a sound or sound sequence to a button. The enhanced page composition segment is herein called a "menu page composition  
5 segment".

This invention, like DVB-ST, uses page composition segments to describe the position of one or more rectangular regions on the display, assuming that a region contains a representation  
10 of one button in a certain state, e.g. as pixel data or bitmap. Each button image is thus addressable through an identifier (ID), or "region\_id". In this embodiment of the invention, backward compatibility is kept with DVB-ST by using an associated segment type ID for the menu page composition  
-----15-----segment. The menu page composition segment is defined as listed in Tab.1.

The "menu page composition segment" according to the invention may also replace the original page composition segment, e.g.  
20 in DVB-ST. A menu page composition segment describes a menu and provides the necessary layout and timing information as well as additional control information.

In one embodiment of the invention, being a simple case with  
25 static menus, each button is represented by e.g. three images. A first image represents the button in the "normal" state, a second image represents the button in the "selected" state and a third image represents the button in the "activated" state. These images may be stored e.g. as bitmap files on the storage  
30 medium, and may be used to display the menu.

In another embodiment, going beyond static menus, the menu page composition segment also allows to describe animated

buttons. In this case, the "normal" state and the "selected" state of a button are each represented through a series of images that are displayed, and may be e.g. cyclically repeated, on the screen to achieve the animation effect. Also  
5 for the "activated" state of a button an animation can be defined, but here it may be advantageous to display the animation phases only once, because the menu will usually disappear or be modified after a button was activated.

10 For all button animations of a menu the menu author can specify an animation frame rate, defining how long each phase of an animation is displayed.

Advantageously, the invention also provides the possibility to  
15 give aural feedback to the user. If a button is either in the "selected" state or in the "activated" state, it may be assigned a sound identifier associated with a sound, which may be stored on the storage medium. The associated sound is played back when the button enters the respective button  
20 state. In one embodiment of the invention the associated sound is played back repeatedly, as long as the button is in the respective state.

The structure of the menu page composition segment and the  
25 semantics of the fields of the menu page composition segment are based on the structure and semantics given in DVB-ST, Section 7.2.1 "Page composition segment". Additional semantics definitions are used for an enhanced menu according to the invention.

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Tab.1 shows the structure of a menu page composition segment according to the invention. Lines 1-8 are identical to the subtitle segment of the DVB-ST standard, giving the

possibility to keep backward compatibility. The meaning of the fields shown in Tab.1 is described in the following. The addressing of pixels is based on a coordinate system whose origin is defined by the top-left corner of the associated video screen. Pixel addresses increase from left to right and from top to bottom. The dimensions of the associated video are defined as video\_width \* video\_height.

	Field	Size	Type
1	menu_page_composition_segment () {		
2	sync byte		
3	segment type	8	bslbf
4	page id	8	bslbf
5	segment length	16	bslbf
6	page time out	16	uimsbf
7	page version number	8	uimsbf
8	page state	4	uimsbf
9	animation frame rate code	2	bslbf
10	reserved	4	uimsbf
11	while (processed_length < segment_length) {	6	bslbf
12	button number	8	uimsbf
13	button horizontal address	16	uimsbf
14	button vertical address	16	uimsbf
15	neighbour_info()		
16	upper_button_number	8	uimsbf
17	lower_button_number	8	uimsbf
18	left_button_number	8	uimsbf
19	right_button_number	8	uimsbf
20	normal_state_info()		
21	start_region_id_normal	8	uimsbf
22	end_region_id_normal	8	uimsbf
23	selected_state_info()	8	uimsbf
24	start_region_id_selected	16	uimsbf
25	end_region_id_selected	8	uimsbf
26	action_state_info()	8	uimsbf
27	start_region_id_activated		
28	end_region_id_activated	8	uimsbf
29	button_command_info()	8	uimsbf
30	sound_info()		
31	selected_sound_id		
32	activated_sound_id	8	uimsbf
33	}	8	uimsbf
34	}		

Tab.1: Syntax of a menu page composition segment

A segment is generally a data unit within the storage area. The *segment\_type* defines its type. The menu page composition segment may be identified by setting e.g. *segment\_type* = 0x18, since this value is not used in DVB-ST yet. The other fields  
5 in lines 2-8 of Tab.1 define the segment data set.

The *animation\_frame\_rate\_code* field specifies the frame rate of animations in the case of animated buttons being used. It applies to a range of regions specified by *start\_region\_id\_xxx* and *end\_region\_id\_xxx*, with the "xxx" referring the state of a  
10 button. If a *start\_region\_id\_xxx* and its corresponding *end\_region\_id\_xxx* differ, they define a range of regions that shall be presented with this animation frame rate. For the normal and selected state, the presentation may be cyclically  
15 repeated; for the "activated" state, the presentation shall be performed only once. When any *start\_region\_id\_xxx* is identical to the associated *end\_region\_id\_xxx*, this designates a static or non-animated button state. Only the region designated by *start\_region\_id\_xxx* is displayed, and for that button state  
20 the *animation\_frame\_rate\_code* shall have no meaning.

Tab.2 shows an exemplary list of *animation\_frame\_rate\_codes*. An animation may be visible at full video frame rate, e.g. 30 pictures per second, meaning that with each video frame  
25 another phase of the animation is displayed. It may also be sufficient to display only with every other video frame another phase of the animated button, thus achieving another effect. Further, it is possible to define the frame rate to either be relative or absolute. Therefore the values of the  
30 *animation\_frame\_rate\_code* field have two different meanings, depending on if an associated video is present. In this case the *animation\_frame\_rate\_code* gives the animation frame rate

relative to the video frame rate, otherwise it gives the absolute frame rate.

animation_frame_rate_code	Relative animation frame rate	Abs. animation Frame rate
0x0	Reserved	Reserved
0x1	Full video frame rate	30 Hz
0x2	½ of video frame rate	15 Hz
0x3	¼ of video frame rate	8 Hz
0x4	1/8 of video frame rate	4 Hz
0x5	1/16 of video frame rate	2 Hz
0x6	1/32 of video frame rate	1 Hz
0x7 - 0xF	reserved	Reserved

Tab.2: Example of animation\_frame\_rate\_code

The button\_number field specifies a number that is an internal identifier for a button, and is used for the fields defined below, e.g. the neighbour\_info() field. Additionally, when button\_number is entered directly through the user interface (UI), the associated button may be activated. Therefore a button\_number is unique within the menu. It may be e.g. a two-digit number in the range between 0 and 99.

Some fields used for menu animation according to the invention must be specified separately for each button. They are listed from line 11 of Tab.1, where a loop over all buttons starts. Each instance of the loop refers to one button. Implicitly, the button described by the first instance of the while-loop within menu\_page\_composition\_segment() may be considered as "selected" when entering the menu, and may be considered as "activated" if a page timeout for the menu is set and becomes active.

The `button_horizontal_address` field specifies the horizontal address of the top left pixel of the button. The specified horizontal position may be in between 0 and `video_width-1`. Likewise, the `button_vertical_address` field specifies the vertical address of the top left pixel of the button. The specified vertical position may be in between 0 and `video_height-1`.

The `upper_button_number` field specifies the button to be selected when the user navigates upward from the current button. The `lower_button_number` field specifies the button to be selected when the user navigates downward from the current button. The `left_button_number` field specifies the button to be selected when the user navigates left from the current button. And the `right_button_number` field specifies the button to be selected when the user navigates right from the current button.

The `start_region_id_normal` field specifies the ID of the first region to be presented for a button presentation in normal state, and the `end_region_id_normal` field specifies the ID of the last region to be presented for a button presentation in normal state. All regions with an ID between and including `start_region_id_normal` and `end_region_id_normal` shall exist; if `start_region_id_normal` differs from `end_region_id_normal`, that range of regions shall be presented cyclically with the animation frame rate as defined by `animation_frame_rate_code`.

The `start_region_id_selected` field specifies the ID of the first region to be presented for a button presentation in the selected state, and the `end_region_id_selected` field specifies the ID of the last region to be presented for a button presentation in the selected state. All regions with IDs

between start\_region\_id\_selected and end\_region\_id\_selected shall exist; if start\_region\_id\_selected differs from end\_region\_id\_selected, that range of regions shall be presented cyclically with the animation frame rate described  
5 by animation\_frame\_rate\_code.

The start\_region\_id\_activated field specifies the ID of the first region to be presented for a button presentation in activated state, and the end\_region\_id\_activated field  
10 specifies the ID of the last region to be presented for a button presentation in activated state. All regions with IDs between start\_region\_id\_activated and end\_region\_id\_activated shall exist; if start\_region\_id\_activated differs from end\_region\_id\_activated, that range of regions shall be  
15 presented once with the animation frame rate described by animation\_frame\_rate\_code.

The button\_command\_info() field serves as a container for commands associated with this button, specifying the commands  
20 to be performed when the button is activated.

Finally, the selected\_sound\_id field specifies the ID of the sound to be played when the button enters the "selected" state, and the activated\_sound\_id field specifies the ID of  
25 the sound to be played when the button enters the "activated" state.

The invention may be used particularly for menus stored on  
30 Blu-ray discs, but also DVD or other optical or non-optical high-capacity storage media.